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Changes and Enhancements to PROCs MEANS/SUMMARY in Version 8 of the SAS® System



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Changes and Enhancements to PROCs MEANS/SUMMARY in Version 8 of the SAS System

- This presentation will discuss many of the important changes to PROCs MEANS and SUMMARY in Version 8 of the SAS System.
- You will also see:
 - Some new features of PROC PRINT
 - Use of the Output Delivery System (ODS)

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Changes and Enhancements to PROCs MEANS/SUMMARY in Version 8 of the SAS System

- Both procedures are key elements of BASE SAS Software
 - Very powerful: rapidly summarize and analyze numeric variables in SAS data sets
 - Became identical procedures in Version 6
 - Create:
 - *Output SAS data sets* (default in PROC SUMMARY)
 - *Output in the SAS Output Window* (default in PROC MEANS)

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Changes and Enhancements to PROCs MEANS/SUMMARY in Version 8 of the SAS System

- A basic example of using PROC MEANS to create a SAS Data Set, then we will look at new features in V8
- Task: from a customer order file data set, obtain the total (sum) dollars of sales by mail code and shipment status

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Changes and Enhancements to PROC MEANS/SUMMARY in Version 8 of the SAS System

- Example Data Set :
 - Customer order file
 - 335,992 observations
 - Potential *Classification* Variables:
 - **Mailcode**
 - Mailing Code (Nine values)
 - **Dept_Nbr**
 - Department number for item (about 40 unique values)
 - **Segment**
 - Customer demographic segment (six values)
 - **Status**
 - 1= Shipped Immediately 2 = Deferred Shipment

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Changes and Enhancements to PROC MEANS/SUMMARY in Version 8 of the SAS System

- Example Data Set (continued):
 - Customer order file
 - 335,992 observations
 - Potential *Analysis* Variables:
 - **ITM_QTY**
 - Number of items ordered
 - **ITM_PRICE**
 - Price (Cost) of Item

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Changes and Enhancements to PROC MEANS/SUMMARY in Version 8 of the SAS System

- Task:
 - Obtain the sum of
 - items sold
 - item prices
 - By
 - MAILCODE
 - STATUS

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```
title 'Changes and Enhancements to PROC MEANS & SUMMARY';  
title2 'In Version 8 of the SAS(r) System';  
title3 'Simple Example of Using PROC MEANS';
```

```
Proc Means NOPRINT
```

```
data=orders.orderfile2(where=(mailcode in('A','B','C')));
```

```
CLASS Mailcode Status; ← _____
```

```
var itm_qty itm_price; ← _____
```

```
OUTPUT out = new sum=total_sold total_revenue;
```

```
RUN;
```


```
proc print data=new;
```

```
run;
```

*Note: longer variable and
data set names in V8*

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**Changes and Enhancements to PROCs MEANS & SUMMARY
In Version 8 of the SAS(r) System
Simple Example of Using PROC MEANS**



Obs	milcode	status	<u>_TYPE_</u>	<u>_FREQ_</u>	total_ sold	total_ revenue
1		.	0	127742	159889	4250086
2		1	1	100505	125708	3340654
3		2	1	27237	34181	909432.4
4	A	.	2	48792	61385	1628543
5	B	.	2	23063	28611	763298.1
6	C	.	2	55887	69893	1858245
7	A	1	3	38373	48243	1276468
8	A	2	3	10419	13142	352074.8
9	B	1	3	18073	22430	599346.1
10	B	2	3	4990	6181	163952.0
11	C	1	3	44059	55035	1464840
12	C	2	3	11828	14858	393405.6

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Changes and Enhancements to PROCs MEANS/SUMMARY in Version 8 of the SAS System

- What Happened?
 - An output (temporary) SAS Data Set was created which contained analyses of the analysis variables at every possible combination (or “crossing”) of the classification variables
 - _TYPE_ variable: ‘level’ of the aggregation
 - _FREQ_ variable: number of observations in the input, or source, data set which contributed to that row/observation in the output data set

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Changes and Enhancements to PROC MEANS/SUMMARY in Version 8 of the SAS System

- What Happened? (continued)
 - The output SAS Data Set was printed to the output window
 - Results shown on prior page
 - Can we do a better job of portraying the SAS-generated output?
 - Yes...if we use the [Output Delivery System \(ODS\)](#)

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Changes and Enhancements to PROC MEANS/SUMMARY in Version 8 of the SAS System

- Using the Output Delivery System
 - Can be used to render SAS-generated output in to
 - HTML
 - RTF (new!)
 - Files
 - Here is an example of using ODS with PROC MEANS

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```

proc template;
  define style Styles.Andrew / store = SASUSER.TEMPLAT;
    parent = styles.minimal;
    style data from cell /
      font = ("arial",3,Bold)
      background = very light yellow vivid
      foreground = red;
    style table from output /
      borderwidth = 3
      bordercolor = Red;
    style Header from headerandfooters /
      font = ("arial",3,Bold);
    style systitle from titlesandfooters /
      font = ("arial,helvetica,helv",4,Bold Italic);
    style rowheader from header /
      font = ("Arial, Helvetica, Helv",3,Bold Italic);
  end;

run;

```

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```

ods html
  path= 'c:\' (url=none)
  body ='means1.html'
  style = styles.andrew/ ;
title 'Changes and Enhancements to PROCs MEANS & SUMMARY';
title2 'In Version 8 of the SAS(r) System';
title3 'Simple Example of Using PROC MEANS';

Proc Means NOPRINT
data=orders.orderfile2(where=(milcode in('A','F','C')));
CLASS Milcode Status;
var itm_qty itm_price;
OUTPUT out = new sum=total_sold total_revenue;
RUN;
proc print data=new;
run;
ods html close;
ods listing;

```

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Changes and Enhancements to PROCs MEANS & SUMMARY

In Version 8 of the SAS(r) System

Simple Example of Using PROC MEANS

Obs	mailcode	status	_TYPE_	_FREQ_	total_sold	total_revenue
1		.	0	127742	159889	4250086
2		1	1	100505	125708	3340654
3		2	1	27237	34181	909432.4
4	A	.	2	48792	61385	1628543
5	B	.	2	23063	28611	763298.1
6	C	.	2	55887	69893	1858245
7	A	1	3	38373	48243	1276468
8	A	2	3	10419	13142	352074.8
9	B	1	3	18073	22430	599346.1
10	B	2	3	4990	6181	163952.0
11	C	1	3	44059	55035	1464840
12	C	2	3	11828	14858	393405.6

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Changes and Enhancements to PROCs MEANS/SUMMARY in Version 8 of the SAS System

- Extensive enhancements in Version 8
 - Improved analytic capabilities
 - New ways to request analyses at different 'crossings' or 'interactions' of the classification variables
 - New features to test the _TYPE_ variable's values
 - Autonaming of variables
 - Multiple CLASS statements permitted

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Changes and Enhancements to PROC MEANS/SUMMARY in Version 8 of the SAS System

- Extensive Enhancements in V8 (con't.)
 - The **DESCENDING** Option can now be used in the CLASS Statement
 - Multiple CLASS Statements are permitted
 - Multiple VAR Statements are permitted

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Changes and Enhancements to PROC MEANS/SUMMARY in Version 8 of the SAS System

- Extensive Enhancements in V8 (con't.)
 - The New **TYPES** Statement
 - Permits user-specified combinations of some of the variables in the CLASS Statement to generate sub-groups/analyses of the numeric variables in the VAR Statement
 - The New **WAYS** Statement
 - Defines the number ways to combine the CLASS variables
 - Additional Functionalities in the **OUTPUT** Statement

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Improved Analytic Capabilities

- PROCs MEANS/SUMMARY now permits calculation of **quantile statistics**, such as the
 - **Median** (50th percentile), 90th percentile, interquartile range
 - Prior to V8, only PROC UNIVARIATE had this capability
 - (PROCs TABULATE and REPORT can also calculate quantile statistics in V8)

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Improved Analytic Capabilities

- Task:
 - Obtain the
 - Total revenue (sum)
 - Average revenue (mean)
 - Median revenue (50th percentile)
 - From the Customer Electric Rate Data Set
 - By Rate Schedule

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Customer Electric Rate Data Set

- Approximately 16,000 observations
 - Premise-level data
 - Monthly Kwh (Kilowatt Hour) Consumption
 - Monthly Billed Revenue
 - Total Revenue
 - Quarterly Revenue
 - Rate Schedule
 - Transformer
 - Region
 - Local Office


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Improved Analytic Capabilities

```
options nocenter nodate nonumber;
ods html
  path= 'c:\' (url=none)
  body ='means3.html'
  style = styles.andrew8 ;

proc MEANS NOPRINT
data=electric.elec_V8;
class rate_schedule;
var total_revenue;
output out=new2 sum=median_REV mean=total_REV
              p50=mean_REV;

run;
proc print data=new2;
run;
```



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Improved Analytic Capabilities

The SAS System

What's "Wrong" With These Results?

Improved Analytic Capabilities: Quantile Statistics in Version 8

Obs	rate_schedule	_TYPE_	_FREQ_	median_REV	total_REV	mean_REV
1		0	15847	11326177.68	714.72	590.51
2	E1	1	14466	10227564.97	707.01	602.07
3	E1L	1	1225	622299.86	508.00	440.65
4	E1M	1	156	476312.85	3053.29	1040.97

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Improved Analytic Capabilities

- What happened?
 - The desired analyses were carried out, and the data set was created, BUT the variable names are incorrect.
 - This is a common problem when creating new variables in the OUTPUT Statement in PROCs MEANS and SUMMARY
 - Solution: the **AUTONAME** option

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The AUTONAME Option

- This option is used in the OUTPUT Statement to have the SAS System automatically name the variables it creates while making an output SAS data set
- The 'analytic operation' is appended to the variable name


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The AUTONAME Option

```
options nocenter nodate nonumber;
ods html path= 'c:\' (url=none) body = 'means4.html'
style = styles.andrew8 ;

proc MEANS NOPRINT
data=electric.elec_V8;
class rate_schedule;
var total_revenue;
output out=new3 sum= mean= p50= /autoname;
run;
proc print data=new3;
title3 'Improved Analytic Capabilities: Quantile Statistics';
title4 'Using the AUTONAME Option';
run;

ods html close;
ods listing;
```



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The AUTONAME Option

Changes and Enhancements to PROCs MEANS & SUMMARY

In Version 8 of the SAS(r) System

Improved Analytic Capabilities: Quantile Statistics

Using the AUTONAME Option



Obs	rate_schedule	_TYPE_	_FREQ_	total_revenue_Sum	total_revenue_Mean	total_revenue_P50
1		0	15847	11326177.68	714.72	590.51
2	E1	1	14466	10227564.97	707.01	602.07
3	E1L	1	1225	622299.86	508.00	440.65
4	E1M	1	156	476312.85	3053.29	1040.97

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Creating Multiple Output SAS Data Sets in PROCs MEANS/SUMMARY

- An often overlooked, but very powerful, feature of these procedures is that **multiple SAS data sets can be created in a single invocation of the procedure.**
- This is often very useful (and more efficient) when multiple output data sets, continuing analyses at different combinations of the CLASS variables, are required.

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Changes and Enhancements to PROCs MEANS/SUMMARY in Version 8 of the SAS System

- A review of the `_TYPE_` variable
 - Represents the level of aggregation among the variables in the `CLASS` statement.
 - If there are four `CLASS` variables, the total number of unique combinations of the variables is 16
 - $2^N = 2^4 = 2*2*2*2 = 16$ (zero to 15)
 - `_TYPE_` can be used to select just a few analyses from all possible combinations of the `CLASS` variables.
 - In Version 6 you needed to know the desired value of `_TYPE_` or create a big data set and then use the bit-testing facility in a Data Step

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Changes and Enhancements to PROCs MEANS/SUMMARY in Version 8 of the SAS System

- Example:
 - Create a 'lightly summarized' data set from the order file. The analysis variables of interest are the sum of
 - ITM_QTY (Quantity Ordered)
 - ITMPRICE (Item Price)

```
proc means noprint data=order.orderfile2;  
class mailcode dept_nbr segment status;  
var itmprice itm_qty;  
output out=new sum=;  
run;
```

**6,723
Observations**

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Changes and Enhancements to PROC MEANS/SUMMARY in Version 8 of the SAS System

- The resulting data set contains the sum of ITMPRICE and ITM_QTY at every possible combination of the four variables in the CLASS Statement

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Changes and Enhancements to PROC MEANS/SUMMARY in Version 8 of the SAS System

- Out of the 15 different combinations of the CLASS variables, suppose a subset data set containing the analysis of ITM_QTY and ITMPRICE at each combination of MAILCODE and STATUS is desired
 - Version 6 approach 1: figure out the appropriate value of `_TYPE_` and use it in a `WHERE` Clause
 - `_TYPE_ = 9`
 - Version 6 Approach 2: Use the `bit-testing facility` in a data step

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Changes and Enhancements to PROC MEANS/SUMMARY in Version 8 of the SAS System

```
proc means noprint data=order.orderfile2;  
class mailcode dept_nbr segment status;  
var itmprice itm_qty;  
output out=new sum=;
```

Version 6 Approach 1

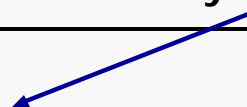
```
Output out=new2(where=(_TYPE_ = 9)) sum=;  
run;
```

Data Set 'new' contains a 'complete analysis' of the variables at all possible combinations of the classification variables, while Data Set 'new2' contains only those observations where _TYPE_ = 9

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Changes and Enhancements to PROC MEANS/SUMMARY in Version 8 of the SAS System

```
data subset;  
set new;  
if _type_ = '1001'b;  
run;
```



*What are the
drawbacks to this
approach?*

Using the Bit
Testing Facility in
the Data Step

Version 6 Approach 2

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Changes and Enhancements to PROCs MEANS/SUMMARY in Version 8 of the SAS System

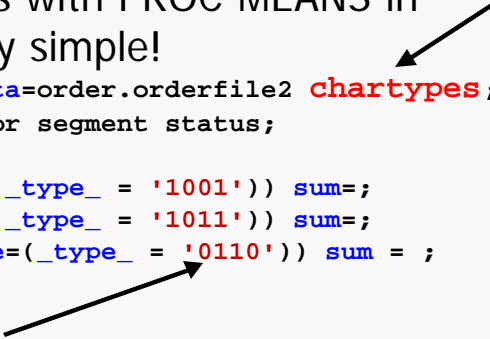
- In Version 8, the **CHARTYPES** option simplifies creation of multiple output SAS data sets from a single use of PROC MEANS.
- This option converts the numeric values of **_TYPE_** to a character variable indicating the combination of **CLASS** Statement variables
 - Although this variable is composed only of zeros and ones, it is a **character variable**

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Changes and Enhancements to PROCs MEANS/SUMMARY in Version 8 of the SAS System

- With the CHARTYPES Option, making subset data sets with PROC MEANS in Version 8 is very simple!

```
proc means noprint data=order.orderfile2 chartypes;  
class mailcode dept_nbr segment status;  
var itmprice itm_qty;  
output out=one(where=(_type_ = '1001')) sum=;  
output out=two(where=(_type_ = '1011')) sum=;  
output out=three(where=(_type_ = '0110')) sum = ;  
run;
```



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Changes and Enhancements to PROC MEANS/SUMMARY in Version 8 of the SAS System

- Another enhancement to PROC MEANS is the **TYPES** Statement (not to be confused with the variable `_TYPE_`)
 - This statement permits creation of specified analyses among the CLASS variables
 - If you have many class variables and only some analyses are required, this approach might be preferable

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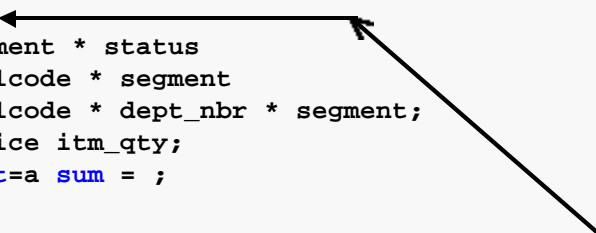
Changes and Enhancements to PROC MEANS/SUMMARY in Version 8 of the SAS System

- Example: Use the **TYPES Statement** with the catalog order file to analyze ITMPRICE and ITM_QTY at the following levels of aggregation:
 - Overall (`_TYPE_ = 0`)
 - Segment by Status (`_TYPE_ = 3`)
 - Mailcode by Segment (`_TYPE_ = 10`)
 - Mailcode by Dept_Nbr by Segment (`_TYPE_ = 14`)

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Changes and Enhancements to PROC MEANS/SUMMARY in Version 8 of the SAS System

```
proc means noprint data=order.orderfile2 ;  
class mailcode dept_nbr segment status;  
types ()  
    segment * status  
    mailcode * segment  
    mailcode * dept_nbr * segment;  
var itmprice itm_qty;  
output out=a sum = ;  
run;
```



TYPES () requests the overall total
TYPE = 0

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Changes and Enhancements to PROC MEANS/SUMMARY in Version 8 of the SAS System

- Using the **DESCENDING** option and multiple **CLASS** statements
 - In Version 6, values of variables placed in the CLASS statement were portrayed in “sort order”
 - The new **DESCENDING** option overrides this default
 - Multiple **CLASS** statements are allowed in a single use of PROC MEANS

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Changes and Enhancements to PROC MEANS/SUMMARY in Version 8 of the SAS System

- Using the new **IDGROUP** option
 - This option allows output of new variables to a data set created by PROC MEANS.
 - Combines the ID and IDMIN options in the PROC MEANS statement and the MAXID and MINID options in the OUTPUT Statement
 - Allows identification of extreme values of the analysis variables
 - The **OUT[N]** option controls the number of extreme observations to be output to the new data set.

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Changes and Enhancements to PROC MEANS/SUMMARY in Version 8 of the SAS System

- Tasks:
- Using the Electric Consumption Data Set
 - Perform the analysis in descending order of the values of REGION
 - Obtain the mean and sum of total revenue
 - Obtain the two largest and two smallest values of total revenue
 - Output to a new SAS data set

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```

ods html path= 'c:\' (url=none) body ='means4. html
      style = styles.andrew9;
proc means
data=electric.elec_v8(
where=(transformer in(' R2448Y', ' A4356C', ' B2348X', ' D8976V'))
      noprint nway;
class region/descending;
class transformer;
var total_revenue ;
output out=c(rename=( _freq_ = Customer_Count) drop=_type_)
idgroup (max(total_revenue) out[2] (total_revenue)=maxrev)
idgroup (min(total_revenue) out[2] (total_revenue)=minrev)
sum= mean= /autoname;
run;

```

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```

proc print data=c split = '_';
title 'Changes & Enhancements to PROCs MEANS &
SUMMARY';
title2 'in Version 8 of the SAS System';
title3 'Using the DESCENDING and IDGROUP Options';
run;
ods html close;
ods listing;

```

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Changes and Enhancements to PROC MEANS/SUMMARY in Version 8 of the SAS System

- More on the IDGROUP statement

idgroup (max(total_revenue) out[2] (total_revenue)=maxrev)

*output the two largest values of TOTAL_REVENUE at each combination of the values of the CLASS variables. The variable prefixes are MAXREV. The variable names are **MAXREV1** and **MAXREV2***

idgroup (min(total_revenue) out[2] (total_revenue)=minrev)

*output the two smallest values of TOTAL_REVENUE at each combination of the values of the CLASS variables. The variable prefixes are MINREV. The variable names are **MINREV1** and **MINREV2***

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Changes & Enhancements to PROC MEANS & SUMMARY in Version 8 of the SAS System Using the DESCENDING and IDGROUP Options


Obs	REGION	transformer	Customer Count	maxrev 1	maxrev 2	minrev 1	minrev 2	total revenue Sum	total revenue Mean
1	WESTERN	A4356C	493	2482.42	2482.42	54.75	54.75	337698.48	684.99
2	WESTERN	B2348X	510	2671.17	2671.17	60.00	60.00	325224.96	637.70
3	WESTERN	D8976V	207	2205.09	2205.09	60.00	60.00	153963.98	743.79
4	WESTERN	R2448Y	301	4943.85	4943.85	113.44	113.44	190438.76	632.69
5	SOUTHERN	A4356C	72	2433.38	2433.38	148.42	148.42	73709.35	1023.74
6	SOUTHERN	B2348X	52	1496.53	1496.53	228.80	228.80	36504.67	702.01
7	SOUTHERN	D8976V	12	877.01	877.01	239.06	239.06	7881.57	656.80
8	SOUTHERN	R2448Y	47	1599.85	1599.85	206.38	206.38	32027.50	681.44
9	NORTHERN	A4356C	581	5850.54	5850.54	60.00	60.00	468485.68	806.34
10	NORTHERN	B2348X	490	2722.55	2722.55	130.08	130.08	427256.15	871.95
11	NORTHERN	D8976V	237	2274.44	2274.44	198.86	198.86	189297.28	798.72
12	NORTHERN	R2448Y	332	3158.60	3158.60	232.31	232.31	258361.37	778.20
13	EASTERN	A4356C	481	3101.83	3101.83	60.00	60.00	294379.91	612.02
14	EASTERN	B2348X	432	16152.28	16152.28	50.00	50.00	342410.95	792.62
15	EASTERN	D8976V	182	2683.75	2683.75	88.59	88.59	113840.69	625.50
16	EASTERN	R2448Y	339	1883.67	1883.67	60.00	60.00	198000.63	584.07

Changes and Enhancements to PROC MEANS/SUMMARY in Version 8 of the SAS System

- A few enhancements to PROC PRINT
 - N = *'text'*
 - OBS = *'text'*
 - Allow customization of the output to further enhance its visual quality

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Changes and Enhancements to PROC MEANS/SUMMARY in Version 8 of the SAS System



```
proc print data=c  
obs = 'Row Number'  
N = 'Number of Rows in This Region:'  
    'Total Rows in This Report:  '  
    split = ' ';  
by DESCENDING Region;  
sum _numeric_;
```

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Changes and Enhancements to PROC MEANS/SUMMARY in Version 8 of the SAS System

```

label customer_count = 'Customer Count'
      total_revenue_sum = 'Total Revenue'
      total_revenue_mean = 'Mean Revenue'
      maxrev_1 = 'Largest Revenue'
      maxrev_2 = '2nd Largest Revenue'
      minrev_1 = 'Smallest Revenue'
      minrev_2 = '2nd Smallest Revenue';

format CustomerCount comma12.
      sumrev_sum sumrev_mean
      maxrev_1 maxrev_2
      minrev_1 minrev_2 dollar12.2;

title 'Summarizing and Reporting Data Using the SAS(R) System';
title2 'New Features in PROC and PRINT';

run;

```

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Summarizing and Reporting Data Using the SAS(R) System New Features in PROC and PRINT REGION=WESTERN

Row Number	transformer	Customer Count	Largest Revenue	2nd Largest Revenue	Smallest Revenue	2nd Smallest Revenue	Total Revenue	Mean Revenue
1	A4356C	493	\$2,482.42	\$2,482.42	\$54.75	\$54.75	337698.48	684.99
2	B2348X	510	\$2,671.17	\$2,671.17	\$60.00	\$60.00	325224.96	637.70
3	D8976V	207	\$2,205.09	\$2,205.09	\$60.00	\$60.00	153963.98	743.79
4	R2448Y	301	\$4,943.85	\$4,943.85	\$113.44	\$113.44	190438.76	632.69
REGION		1511	\$12,302.53	\$12,302.53	\$288.19	\$288.19	1007326.18	2699.16
Number of Rows in This Region:4								

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REGION=SOUTHERN

Row Number	transformer	Customer Count	Largest Revenue	2nd Largest Revenue	Smallest Revenue	2nd Smallest Revenue	Total Revenue	Mean Revenue
5	A4356C	72	\$2,433.38	\$2,433.38	\$148.42	\$148.42	73709.35	1023.74
6	B2348X	52	\$1,496.53	\$1,496.53	\$228.80	\$228.80	36504.67	702.01
7	D8976V	12	\$877.01	\$877.01	\$239.06	\$239.06	7881.57	656.80
8	R2448Y	47	\$1,599.85	\$1,599.85	\$206.38	\$206.38	32027.50	681.44
REGION		183	\$6,406.77	\$6,406.77	\$822.66	\$822.66	150123.09	3063.99
Number of Rows in This Region:4								

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REGION=NORTHERN

Row Number	transformer	Customer Count	Largest Revenue	2nd Largest Revenue	Smallest Revenue	2nd Smallest Revenue	Total Revenue	Mean Revenue
9	A4356C	581	\$5,850.54	\$5,850.54	\$60.00	\$60.00	468485.68	806.34
10	B2348X	490	\$2,722.55	\$2,722.55	\$130.08	\$130.08	427256.15	871.95
11	D8976V	237	\$2,274.44	\$2,274.44	\$198.86	\$198.86	189297.28	798.72
12	R2448Y	332	\$3,158.60	\$3,158.60	\$232.31	\$232.31	258361.37	778.20
REGION		1640	\$14,006.13	\$14,006.13	\$621.25	\$621.25	1343400.48	3255.21
Number of Rows in This Region:4								

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REGION=EASTERN								
Row Number	transformer	Customer Count	Largest Revenue	2nd Largest Revenue	Smallest Revenue	2nd Smallest Revenue	Total Revenue	Mean Revenue
13	A4356C	481	\$3,101.83	\$3,101.83	\$60.00	\$60.00	294379.91	612.02
14	B2348X	432	\$16,152.28	\$16,152.28	\$50.00	\$50.00	342410.95	792.62
15	D8976V	182	\$2,683.75	\$2,683.75	\$88.59	\$88.59	113840.69	625.50
16	R2448Y	339	\$1,883.67	\$1,883.67	\$60.00	\$60.00	198000.63	584.07
REGION		1434	\$23,821.53	\$23,821.53	\$258.59	\$258.59	948632.18	2614.21
		4768	\$56,536.96	\$56,536.96	\$1,990.69	\$1,990.69	3449481.92	11632.56
Number of Rows in This Region:4								
Total Rows in This Report: 16								
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Using the **PRELOADFMT** and **COMPLETETYPES** Options

- By default, a format is applied to the values of a classification variable AFTER PROC MEANS has performed the desired analyses
 - If no observations in the input data set have a formatted value of the classification variable, that formatted value is not portrayed in the PROC MEANS-generated output

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Using the **PRELOADFMT** and **COMPLETETYPES** Options

- The **PRELOADFMT** Option is placed in the CLASS statement and instructs PROC MEANS to load the format in to memory before conducting the analysis
- The **COMPLETETYPES** Option, in the PROC MEANS statement, results in having all the formatted values of the classification variable portrayed, even if there are no observations in the input data set have that formatted value.

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Using the **PRELOADFMT** and **COMPLETETYPES** Options

- Example:
 - From the Customer Order File
 - Analyze sales by Demographic Segment (SEGMENT)
 - First, a format is applied to the one-byte character variable to 'alter the external representation of the value of the variable'

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```

proc format
library = orders;
value $segfmt
'A' = '1) Paycheck to Paycheck (A)'
'B' = '2) Rural Retirees (B)'
'C' = '3) Suburban Strivers (C)'
'I' = '4) Soccer Moms & Dads (I)'
'J' = '5) Young Families (J)'
'L' = '6) Urban Pioneers (L)'
'N' = '7) Stable Golden Years (N)'
'O' = '8) Solidly Suburban (O)'
'R' = '9) Dot Com Dandies (R)';
RUN;

```

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Using the PRELOADFMT and COMPLETETYPES Options

- Now that this format is available, we can use it to improve the visual appeal of a data set created by PROC MEANS which analyzed the customer order file
 - Tasks:
 - Obtain the average number of items ordered
 - Obtain the mean price of items ordered
 - By SEGMENT

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Using the PRELOADFMT and COMPLETETYPES Options

```
options fntsearch = (orders) nocenter nodate;
ods html path= 'c:\' (url=none)
body = 'means4.html' style = styles.andrew8;
proc means noprint data=orders.orderfile2;
format segment $segfmt.;
class segment/PRELOADFMT;
var itmprice itmqty;
output out=x mean = /autoname;
run;
```

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Changes and Enhancements to PROCs MEANS & SUMMARY in V8 Using the COMPLETETYPES and PRELOADFMT Options

Obs	SEGMENT	_TYPE_	_FREQ_	ITMPRICE_Mean	ITM_QTY_Mean
1		0	335992	\$33.3229	1.24856
2	3) Suburban Strivers (C)	1	268704	\$32.6979	1.24544
3	4) Soccer Moms & Dads (I)	1	10592	\$35.3829	1.23688
4	6) Urban Pioneers (L)	1	22250	\$29.2650	1.20548
5	7) Stable Golden Years (N)	1	32828	\$39.8366	1.23626
6	8) Solidly Suburban (O)	1	1194	\$40.0112	3.17588
7	9) Dot Com Dandies (R)	1	424	\$67.7493	1.29953

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Using the **PRELOADFMT** and **COMPLETETYPES** Options

- Although there were nine values in the format, only six values of SEGMENT were portrayed in the preceding output
 - That's because no customer records exist in the data set for customers in those three demographic categories.
- By default, PROC MEANS ordered the observations in the output data set using the formatted value of the classification variable.

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Using the **PRELOADFMT** and **COMPLETETYPES** Options

- Using the **PRELOADFMT** and **COMPLETETYPES** options generates a data set with ALL formatted values of the variable.
- Also, we can re-arrange the ordering of the CLASS variables using the **ORDER=** option.


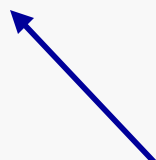
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Using the **PRELOADFMT** and **COMPLETETYPES** Options

- In the next example, the **PRELOADFMT** and **COMPLETETYPES** Options are used to generate a data set that includes values of the **CLASS** variable (demographic segment) for which there are no observations in the analysis data set
- The **ORDER=FREQ** option in the **CLASS** statement instructs PROC MEANS to order the observations from highest to lowest frequency

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Using the **PRELOADFMT** and **COMPLETETYPES** Options

```
proc means noprint data=orders.orderfile2  
      COMPLETETYPES ;   
format segment $segfmt. ;  
class segment/order=freq PRELOADFMT;   
var itmprice itm_qty;  
output out=x mean = /autoname;  
run;
```

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***Changes and Enhancements to PROCs MEANS & SUMMARY in V8
Using the COMPLETETYPES and PRELOADFMT Options
Using the ORDER=FREQ Option***

Obs	SEGMENT	_TYPE_	_FREQ_	ITMPRICE_Mean	ITM_QTY_Mean
1		0	335992	\$33.3229	1.24856
2	3) Suburban Strivers (C)	1	268704	\$32.6979	1.24544
3	7) Stable Golden Years (N)	1	32828	\$39.8366	1.23626
4	6) Urban Pioneers (L)	1	22250	\$29.2650	1.20548
5	4) Soccer Moms & Dads (I)	1	10592	\$35.3829	1.23688
6	8) Solidly Suburban (O)	1	1194	\$40.0112	3.17588
7	9) Dot Com Dandies (R)	1	424	\$67.7493	1.29953
8	1) Paycheck to Paycheck (A)	1	0	.	.
9	2) Rural Retirees (B)	1	0	.	.
10	5) Young Families (J)	1	0	.	.

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Another Option in the CLASS Statement

- Another option (shown in a previous example) is ORDER=DESCENDING

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Summary and Conclusions

- Significant enhancements to PROCs
MEANS and SUMMARY are available to
SAS Users in Version 8 of the SAS System.
 - Quantile Statistics
 - TYPES and WAYS Statements
 - CHARTYPE, PRELOADFMT Options
 - IDGROUP Option in the Output Statement

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Summary and Conclusions

- Additional Options Not Discussed in this
Presentation
 - CLASSDATA
 - GROUPINTERNAL
 - KEEPLEN
 - NOTRAP
 - INHERIT/NOINHERIT
 - AUTOLABEL
 - Creating _LEVELS_ and _WAYS_ Variables in output data
sets
 - Using Multilevel Formats (MLF)

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Learning More...

[http://www.sas.com/service/library/
onlinedoc/v8/
whatsnew/tw5508/z1335349.htm](http://www.sas.com/service/library/onlinedoc/v8/whatsnew/tw5508/z1335349.htm)

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Using Multilevel Formats with PROC MEANS and SUMMARY

- A new feature available in PROC FORMAT allows creation of multilevel formats.
- The next example shows how a multilevel format can be used in PROC MEANS
- The MLF option in the CLASS statement instructs PROC MEANS to create subgroup combinations when a multilabel format is assigned to a classification variable.

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```

proc format library = orders;
value totalf (multilabel)
1 - 1000 = '1 to 1,000'
1001 - 2000 = '1,001 to 2,000'
2001 - 3000 = '2,001 to 3,000'
3001 - high = '3,001 or more'
1000 - 1500 = 'a) 1,000 to 1,500'
1501 - 2000 = 'b) 1,501 to 2,000'
2001 - 2500 = 'c) 2,001 to 2,500';
run;

```


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```

ods html path= 'c:\' (url=none) body = 'means4.html'
style = styles.andrew8;

proc means noprint completetypes NWY
data=orders. orderhistory;
format tot_sales_ant totalf segment $segfmt.;
class segment/preloadfmt descending;
class tot_sales_ant/MF preloadfmt
order=formatted;
var tot_sales_ant;
output out=new(drop=_type_ _freq_)
n = Customer_Count;
run;

```



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```

proc print data=new noobs;
title1 'Changes and Enhancements to PROCs
MEANS & SUMMARY';
title2 'in Version 8 of the SAS System';
title3 'Using MULTILABEL Formats';

ods html close;
ods listing;

```

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***Changes and Enhancements to PROCs MEANS & SUMMARY
in Version 8 of the SAS System
Using MULTILABEL Formats***

SEGMENT	tot_sales_amt	Customer_Count
9) Dot Com Dandies (R)	1 to 1,000	8
9) Dot Com Dandies (R)	1,001 to 2,000	2
9) Dot Com Dandies (R)	2,001 to 3,000	2
9) Dot Com Dandies (R)	3,001 or more	3
9) Dot Com Dandies (R)	a) 1,000 to 1,500	1
9) Dot Com Dandies (R)	b) 1,501 to 2,000	1
9) Dot Com Dandies (R)	c) 2,001 to 2,500	1
8) Solidly Suburban (O)	1 to 1,000	37
8) Solidly Suburban (O)	1,001 to 2,000	8
8) Solidly Suburban (O)	2,001 to 3,000	2
8) Solidly Suburban (O)	3,001 or more	2
8) Solidly Suburban (O)	a) 1,000 to 1,500	7
8) Solidly Suburban (O)	b) 1,501 to 2,000	1
8) Solidly Suburban (O)	c) 2,001 to 2,500	2

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**Changes and Enhancements to PROCs MEANS & SUMMARY
in Version 8 of the SAS System
Using MULTILABEL Formats**

5) Young Families (J)	1 to 1,000	0
5) Young Families (J)	1,001 to 2,000	0
5) Young Families (J)	2,001 to 3,000	0
5) Young Families (J)	3,001 or more	0
5) Young Families (J)	a) 1,000 to 1,500	0
5) Young Families (J)	b) 1,501 to 2,000	0
5) Young Families (J)	c) 2,001 to 2,500	0
4) Soccer Moms & Dads (I)	1 to 1,000	332
4) Soccer Moms & Dads (I)	1,001 to 2,000	68
4) Soccer Moms & Dads (I)	2,001 to 3,000	13
4) Soccer Moms & Dads (I)	3,001 or more	14
4) Soccer Moms & Dads (I)	a) 1,000 to 1,500	49
4) Soccer Moms & Dads (I)	b) 1,501 to 2,000	19
4) Soccer Moms & Dads (I)	c) 2,001 to 2,500	9

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**Thanks for Inviting Me
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